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*To one familiar alone with the easily studied and regular structure of a root-hair developed in a moist chamber, the root-hair as it grows in the soil is not recognizable except as it is traced to its point of attachment among the other epidermal cells of the root. Parallel to this statement it may be said that to one familiar alone with mold hyphæ as they may develop with freedom in liquid or solid culture media such as agar or gelatine, the mold hyphæ growing under natural conditions among sugar crystals or between soil particles are totally unrecognizable, neglected and passed over. No suitable bacteriological methods of making dry smears or stained preparations have yet been devised for demonstrating molds in such situations. These mold hyphæ are enough larger than minute bacteria to be plasmolyzed and for their structure to be dried out beyond recognition by this exceedingly harsh treatment. The best of objectives with high magnifications are required to demonstrate this close relation of mold hyphæ either to sugar crystals or to soil particles. For this an oil immersion objective must have a long working distance to permit a mount as thick as a sugar crystal or soil particle to be examined with the mold hyphæ attached. This has been possible with such a combination as a Zeiss 3 mm. N. A. 1.30 apochromatic objective and a 12 X compens. ocular. Few other available combinations will give the necessary clarity of field, magnification and working distance to demonstrate the intimate relationship existing between the mycelium of saprophytic molds and certain substrata.

This intimate relationship between mold hyphæ and the substratum explains why many have overlooked active growths of molds in the soil and others have denied it. It explains also in part the spoilage of certain foodstuffs such as sugar. Much damage can undoubtedly take place without macroscopic evidence of mold. Mold hyphæ have just such an intimate relationship to sugar crystals or soil particles as is well known to exist between root hairs of higher plants and the soil particles of the ground wherein they grow.

MARGARET B. CHURCH,
CHARLES THOM

THE AMERICAN CHEMICAL SOCIETY

(Continued)

DIVISION OF ORGANIC CHEMISTRY

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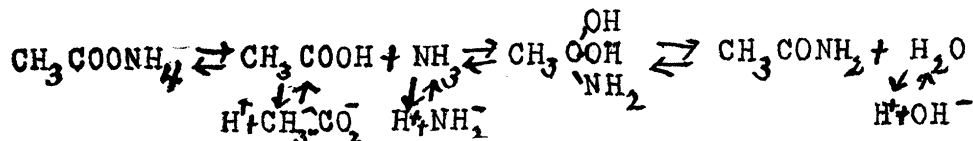
Oximes: F. W. ATACK.

Organo tellurium bases: A. LOWRY AND R. F. DUNBROOK. Aromatic bases and TeBr_4 react in ether or acetic acid solution to produce organo tellurium bases. The following complexes have been prepared and analyzed:

$(\text{C}_6\text{H}_5\text{NH}_2)_2 \cdot \text{TeBr}_4$
= Bi-aniline tellurium tetrabromide,
 $[\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_2]_2 \cdot \text{TeBr}_4$
= Bi-dimethylaniline tellurium tetrabromide,
 $(\beta\text{-C}_{10}\text{H}_7\text{NH}_2)_2 \cdot \text{TeBr}_4$
= Bi- β -naphthylamine tellurium tetrabromide,
 $p\text{-C}_6\text{H}_4(\text{NH}_2)_2 \cdot \text{TeBr}_4$
= p-phenylenediamine tellurium tetrabromide,
 $m\text{-C}_6\text{H}_4(\text{NH}_2)_2 \cdot \text{TeBr}_4$
= m-toluylenediamine tellurium tetrabromide,
 $(p\text{-BrC}_6\text{H}_4\text{NH}_2)_2 \cdot \text{TeBr}_4$
= Bi-p-bromoaniline tellurium tetrabromide,
 $[(\text{C}_6\text{H}_5)_2\text{NH}]_2 \cdot \text{TeBr}_4$
= Bi-diphenylamine tellurium tetrabromide,
 $\text{H}_2\text{NC}_3\text{H}_4 \cdot \text{C}_6\text{H}_4 \cdot \text{NH}_2 \cdot \text{TeBr}_4$
= Benzidine tellurium tetrabromide,
 $[(\text{CH}_3)_2\text{N} \cdot \text{C}_6\text{H}_4]_2 \cdot \text{CH}_2 \cdot \text{TeBr}_4$
= Tetramethyl-diamino-diphenyl-methane tellurium tetrabromide.

Alkaloids also produce complexes with TeBr_4 .

The rôle of acetic acid and ammonia as catalysts in the formation of acetamide from ammonia acetate: W. A. NOYES AND WALTHER GOEBEL. Dr. M. A. Rosanoff showed several years ago that acetamide may be prepared at atmospheric pressure by heating ammonium acetate with an excess of glacial acetic acid. He considered that the acetic acid is a catalytic agent but, as he worked under conditions such that the water formed distilled away, he did not actually prove whether the acetic acid acted as a catalyst or whether it merely retained the ammonia and made it possible to heat the mixture to a higher temperature without the loss of much ammonium acetate by dissociation. By heating ammonium acetate in sealed tubes, alone, and again with acetic acid and in other experiments with ammonia, we have shown that either acetic acid or ammonia acts as a catalyst and hastens the reaction. The liberation of ammonia by the addition of a little sodium hydroxide to the ammonium acetate, however, retards the reaction, probably because the acetate ions from the sodium acetate formed repress the ionization of the acetic acid formed by the dissociation of the ammonium acetate. These



results point to the above mechanism for the reaction.

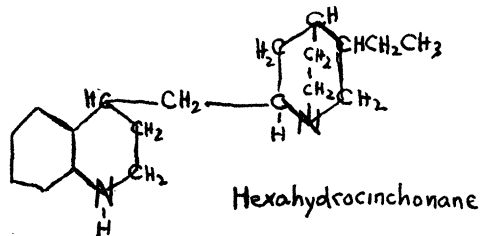
If this is accepted, it would seem that acetic acid catalyzes the reaction chiefly through its hydrogen ions and ammonia through its amide, NH_2 , ion.

Preparation of absolute alcohol: W. A. NOYES. Beilstein contains a statement that alcohol is dehydrated commercially by means of calcium chloride but I have been able to find no other reference to the matter in the literature. A careful study has brought out the following: From strong alcohol containing somewhat more than one mol of calcium chloride for each mol of water present, alcohol of 99 per cent. or stronger may be distilled. On concentrating such a solution a solid alcoholate (not a hydrate) separates and there is an equilibrium between the alcoholate and hydrate present. A quite high temperature is required to expel the alcohol from this solid but if enough water is added so that about 5 mols are present for each mol of calcium chloride, the alcohol may be distilled away completely at a temperature below 140° . The hydrate of calcium chloride which remains is liquid at 100° , or above, but solidifies at ordinary temperatures. On the basis of the facts given, 99 per cent. alcohol may be prepared, by means of calcium chloride, without loss of alcohol. The remainder of the water can then be removed by lime or by some other method.

5, 8-diamino-dihydroquinine and 5, 8-diamino-6-methoxyquinoline, and their conversion into the corresponding amino-hydroxy and dihydroxy bases: WALTER A. JACOBS AND MICHAEL HEIDELBERGER. 5, 8-diamino-dihydroquinine, obtained by reducing 5-amino-8-*p*-sulfophenylazo-dihydroquinine (*J. Am. Chem. Soc.*, 1920, xlii, 2281); decomposes at $125-40^\circ$, and yields a vermilion, crystalline tetrahydrobromide, and a brown crystalline sulfate decomposing at $220-7^\circ$. 5-hydroxy-8-phenylazo-dihydroquinine (*Ibid.*, p. 2280) yielded a crystalline double tin salt of 5-hydroxy-8-amino-dihydroquinine, the base and other salts being very unstable. Boiled with 1:1 hydrochloric acid the diamino compound yielded the dihydroxy dihydrochloride, vermilion needles decomposing at $208-11^\circ$ (anhydrous), also obtained from acid solutions of the amino-hydroxy compound on long standing. For comparison the series derived from 6-methoxyquinoline was also

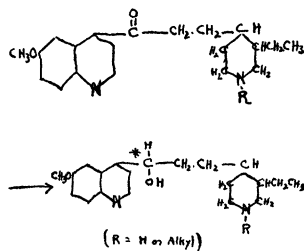
prepared, 5, 8-diamino-6-methoxyquinoline forms golden leaflets melting at $163-4^\circ$; 5-hydroxy-8-amino-6-methoxyquinoline yellow crystals melting at $180-2^\circ$, and the 5, 8-dihydroxy compound yellow crystals melting at $195-7^\circ$. The lability of the amino groups in these compounds as well as in the previously reported dyes is thus shown to be of a high order.

The hydrogenation of dihydrocinchonine, cinchonine, and dihydroquinine: WALTER A. JACOBS AND MICHAEL HEIDELBERGER. By reducing dihydrocinchonine with sodium in boiling amyl alcohol and converting into the hydrochlorides two stereoisomeric hexahydro bases were isolated, in which the 2 ν alcoholic group had also been reduced. These α - and β -hexahydrocinchonanes (for terminology see *J. Am. Chem. Soc.*, 1920, xlii, 1492) were crystalline, and yielded characteristic hydrochlorides, nitroso, benzoyl, and phenylazo derivatives, thus showing the properties of tetrahydroquinolines. From the mother liquors a small amount of hexahydrocinchonine dihydrobromide was isolated. The α - and β -compounds were also obtained by reducing dihydrocinchonane. Cinchonine yielded an α -tetrahydrocinchonane, convertible into the α -hexahydro compound with Pd and H, while the mother liquors also reduced with Pd and H gave the α -, β -, and hexahydrocinchonine-compounds. Dihydroquinine yielded chiefly hexahydroquinine dihydrochloride, characterized by the nitroso and benzoyl derivatives.



A new series of cinchona-like alkaloids: the dihydroquinicins: MICHAEL HEIDELBERGER AND WALTER A. JACOBS. Reduction of the quinicines (quinotoxines) with palladium and hydrogen gives rise to a new series of alkaloids with an asymmetric secondary alcoholic group, thus resembling the cinchona alkaloids themselves. Quini-

cine hydrochloride gave *d*-dihydroquinicinel nitrate, which yielded the crystalline base and dihydrochloride. Only the *l*-dihydrochloride could be obtained. *N*-methylquinicine dihydrochloride gave both *d*- and *l*-*N*-methyl-dihydroquinicinel, which crystallized readily. The *d*-hydrobromide, dihydrochloride, and methiodide were prepared, as well as the *l*-dihydrochloride and methiodide. Similarly, *N*-ethylquinicine hydrochloride gave the *d*-base, from which the mono- and dihydrochlorides and methiodide were prepared. An *l*-dihydrochloride was also isolated. Ethyldihydrocpreicine sulfate (optotoxin) gave the *d*-hydrochloride, from which the base and dihydrochloride were obtained. Methyl and ethyl iodide yielded the corresponding crystalline *N*-alkyl bases. *d*- and *l*-dihydrocinchonine sulfate were also obtained.



The action of ammonia on chlorobenzene and bromobenzene in the vapor state in presence of catalysts: A. LOWY AND A. M. HOWALD. Ammonia mixed with the vapor of a halogenated benzene compound was passed over various catalysts at elevated temperatures to determine the possibility of replacing the halogen by the NH_2 group. Iron, nickel and cobalt were the only active catalysts. The optimum temperature for iron was 480°C . and gave a yield of 7.35 per cent. of aniline. The catalysts used were rapidly poisoned. This substantiates previous experimental evidence that halogens have poisonous effects upon catalysts. Several oxides, salts, elements and alloys were also tried as catalysts.

The effect of fullers' earth on pinene and other terpenes: C. S. VENABLE AND E. C. CROCKER.

An investigation has been made of the effect, under various experimental conditions, of fullers' earth on pinene and other terpenes. In the presence of fullers' earth, various terpenes react spontaneously or upon a slight elevation of temperature. In the case of pinene, the first effect is that of intermolecular rearrangement, the chief products being dipentene and terpinene. These

terpenes again react in the presence of fullers' earth to give dipinene, boiling point 320°C . It is conceivable that the intermolecular rearrangement and the polymerization take place simultaneously. The local overheating of the 320° fraction in the presence of fullers' earth results in a depolymerization with a formation of paraffin hydrocarbons, *p*-cymene, etc., and the 360° fraction. The course of reaction as thus shown is entirely different from that indicated by the work of Gurvich, *J. R. P. C. S.*, 1915-16. A similar set of reactions has been observed for dipentene, terpinene, camphene, beta pinene, active limonene, sabinene and terpineol. The reaction in the case of cineol is very slow; *p*-cymene does not give a reaction.

A study in yields in nitrating nitrotoluenes: J. M. BELL AND D. M. CARROLL.

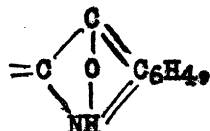
Studies on nucleic acids: The reduction of uracil and cytosine by means of colloidal platinum: TREAT B. JOHNSON AND ELMER B. BROWN. The reduction of uracil leads to a quantitative production of hydrouracil, which can be hydrolyzed quantitatively to β -alanine. Transformations can be brought about at low temperatures in the pyrimidine series by catalytic reduction which can not be accomplished by other means.

Studies on nucleic acids: New color tests for the pyrimidine-thymine, applicable in the presence of uracil, cytosine and sugars: TREAT B. JOHNSON AND OSKAR BAUDISCH. Thymine is oxidized in the presence of ferrous sulphate with formation of urea, pyruvic acid and acetol. Both pyruvic acid and acetol can be identified by characteristic color tests, which serve for the indirect identification of thymine. The reaction is of immediate service in determining the constitution of nucleic acids.

Hydantoin indigoids: ARTHUR J. HILL AND HENRY R. HENZE. (By title.) Nuclear aromatic aldehydes condense readily with the methylene (CH_2) group of hydantoin and many of its derivatives. On the contrary, however, only three aliphatic aldehydes have been directly combined with hydantoin while there is no literature bearing on the behavior of the carbonyl group of ketones toward this type of compound. The writers have been able to effect condensation between certain hydantoins, namely, 1-phenyl-2-thiohydantoin, 1-phenylhydantoin and hydantoin, and the cyclic ketone isatin, and its chloride. Two types of condensation products have thus been obtained,

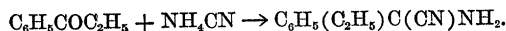
namely, β -isatin derivatives from isatin itself, and α -derivatives from the α -chloride.

These new products are all highly colored, and, in their molecular configuration, resemble the dyes of the indigoid group. The color of α -derivatives, which contain the true indigoid chromophore,

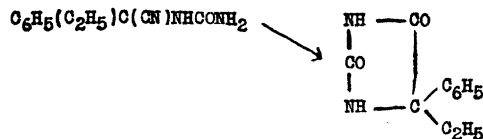


as postulated by Claasz, is deeper than that of the corresponding β -homologues.

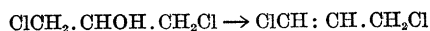
Synthesis of the soporific nirvanol (4, 4-phenyl ethyl hydantoin): WILLIAM T. READ. Nirvanol (4, 4-phenyl ethyl hydantoin), a soporific now extensively used in Europe, has been made in good yield by the following method. Phenyl ethyl ketone, prepared from propionyl chloride and benzene by the Friedel and Crafts reaction, is condensed with ammonium cyanide in alcohol solution.



The resulting α -phenyl α -aminobutyronitrile, or its hydrochloride, is treated with potassium cyanate in glacial acetic acid solution, whereby phenyl ethyl hydantoin nitrile is obtained. The nitrile is readily converted into 4, 4-phenyl ethyl hydantoin by boiling with hydrochloric acid.



The synthesis of β -chlorallylchloride from α , γ -dichlorhydrin: ARTHUR J. HILL AND EDWIN J. FISCHER. A practical method for preparing chlorallylchloride is not described in the chemical literature. A method has now been developed for the practical preparation of this chloride from dichlorhydrin by dehydration of the latter with phosphorus oxychloride. This chloride is of immediate interest and value



for the synthesis of new organic combinations of therapeutic and pharmacological interest.

The action of ferrous hydroxide-peroxide on thymine, lactic acid and alanine: OSKAR BAU-

DISCH. Ferrous hydroxide-peroxide acts in a double capacity as an oxidizing and a reducing agent. From a biochemical standpoint it behaves like an enzyme. As a chemical reagent it has received hitherto very limited attention, but its marked activity at ordinary temperature due to the presence of iron in its molecule stimulates a special interest in a study of its action on biochemical products.

The behavior of cystine to acid hydrolysis: WALTER F. HOFFMAN AND ROSS AIKEN GORTNER. Many authors agree that the amino acid, cystine, is destroyed by acid hydrolysis but no decomposition products have been isolated. In the present study a large quantity of cystine was boiled with 20 per cent. hydrochloric acid for 196 hours, aliquots being removed at intervals of 3, 6, 12, 24, 48, 96, 144, and 196 hrs. Various possible chemical changes were followed throughout this period. The authors find that (1) decarboxylation and deamination proceed very slowly, (2) that the sulfur is not markedly broken off by boiling, and (3) that the major change is the alteration of the cystine molecule into an "isomeric" cystine with different crystal form and different solubilities, which forms different derivatives from ordinary cystine. Approximately 90 per cent. of the original cystine was isolated as "isomeric" cystine after boiling for 196 hrs.

A comparison of certain derivatives of "protein" cystine and the "isomeric" cystine formed by acid hydrolysis: ROSS AIKEN GORTNER AND WALTER F. HOFFMAN. Certain derivatives of the "isomeric" cystine noted in the preceding paper were compared with the corresponding derivatives of the natural l. cystine. Protein cystine crystallizes in large hexagonal plates, the isomeric cystine in tiny microscopic prisms. The benzoyl derivative of l. cystine crystallizes in needles, m. p. 180–181°. The "isomeric" benzoyl derivative crystallizes in diamond-shaped crystals, m. p. 168°. The phenyl isocyanates melt at 148–149° and (isomeric) 181°, respectively. It was found impossible to prepare a phenyl hydantoin from the phenyl isocyanate of the isomeric cystine, whereas a phenyl hydantoin melting at 122–123° was easily prepared from the corresponding derivative of the normal l. cystine. The cysteic acids were prepared and show different properties and different crystal form. The study is being continued.

CHARLES L. PARSONS
Secretary